



Digisonde and Ionogram Techniques in Comparative Vertical Ionospheric Drift Analysis

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This study focuses on comparing various measurement techniques and methods employed in calculating the vertical drift of ionospheric plasma in the F-layer of the ionosphere. We identify differences and similarities among selected methods based on ground-based sounding applied to classical ionosonde measurements and advanced Digisondes. Specifically, we further investigate and compare the resulting vertical plasma drift velocities obtained from direct measurements using Digisonde Drift Measurement (DDM) and vertical drifts derived from indirect methods based on the temporal variation of characteristic ionogram features.

Two representative cases measured at the mid-latitude observatory in Pruhonice (50.0° N, 14.6° E) are utilized for this comparative analysis. Two high-speed campaigns lasting one day each were conducted for ionogram measurements (at 1 and 2-minute temporal resolutions) and direct drift measurements in the F-region.

This study compares the results of different methods across various time scales. The key finding is that the results of indirect methods generally align well with direct DDM measurements for time scales above 15 minutes. This temporal range typically corresponds to the standard cadence of ionogram measurements. However, when calculating vertical drifts using indirect methods with shorter time intervals between ionograms, significant differences emerge compared to DDM results. For time intervals between ionograms below 5 minutes, highly divergent results are consistently observed. These disparities arise from the practical challenge of determining vertical drift with sufficient precision for small time differences between ionograms. In contrast, DDM results remain stable and consistent even at the shortest time scales.

1. D. Kouba, Z. Mošna, P. Koucká Knížová, “Digisonde and Ionogram Techniques in Comparative Vertical Ionospheric Drift Analysis,” submitted.